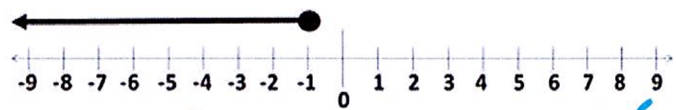
Mr. Michael T. Davis Pre-Calculus	Final Exam Review (Practice Exam) Units 1 through 5 May 16, 2016

Name: Answers

Important Note: This review packet does not contain questions from our current and final unit, namely Unit 5. I will provide review materials for Unit 5 at the end of next week.

1. Write the domain of the graph in both inequality and interval notation.



Inequality: $x \le -1$ Interval: $(-\infty, -1]$

2. Write the domain of the graph in both inequality and interval notation.

Inequality: $-2 \le x < 5$ Interval: $[-2, +5)$

3. Solve each inequality. Graph the solution set on a number line, AND write the solution in interval notation.

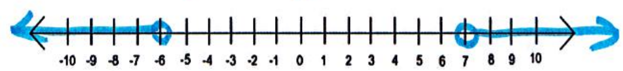
a. $-1 < \frac{1}{2}p + 4 \le 8$

$-5 < \frac{1}{2}p \le 4$ $-10 < p \le 8$ $(-10, 8]$

b. $4 - 2x > 16$ *or* $3x - 10 > 11$

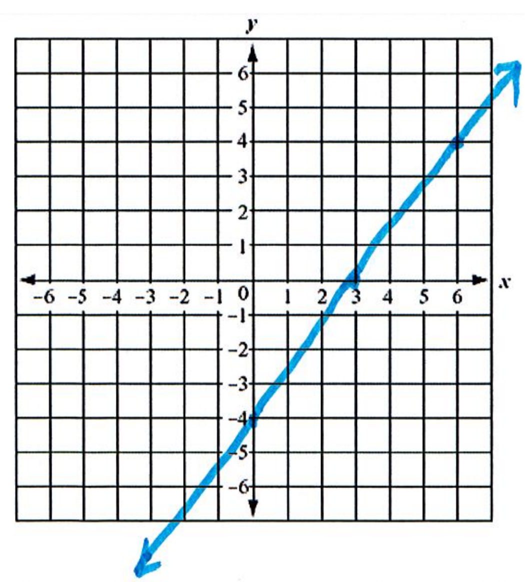
$-2x > 12$ or $3x > 21$

$x < -6$ or $x > 7$

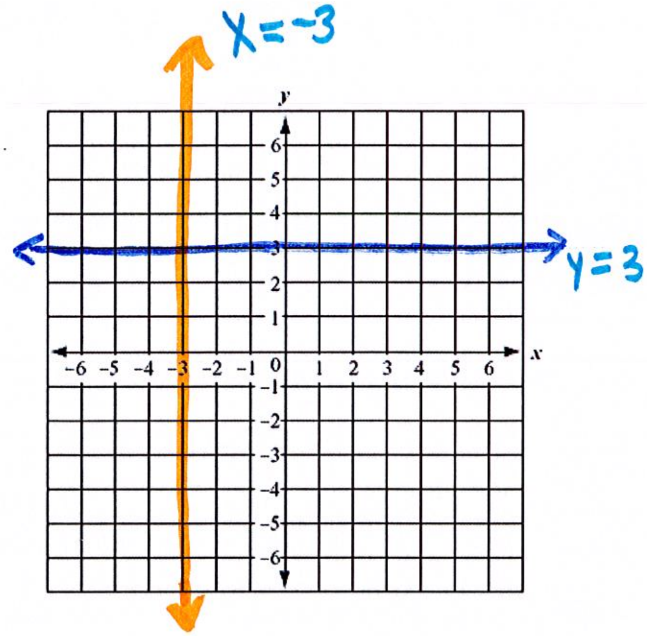


4. Graph the line with equation $4x - 3y = 12$

$(0, -4)$ $(3, 0)$



5. Write an equation for each line shown.



6. Given a line containing the points $(-2,5)$ and $(-4,2)$. Find an equation of the line in slope-intercept form. Convert your equation to standard from.

$m = \frac{2-5}{-4--2} = \frac{-3}{-2} = \frac{3}{2}$

$y = \frac{3}{2}x + b$

$5 = \frac{3}{2}(-2) + b$

$5 = -3 + b$

$8 = b$

$y = \frac{3}{2}x + 8$

$2y = 3x + 16$

$2y - 3x = 16$

$3x - 2y = -16$

7. Simplify $49^{\frac{1}{2}}$ $= 7$

8. Simplify $27^{\frac{2}{3}} =$ $\left(27^{\frac{1}{3}}\right)^2 = 3^2 = 9$

9. $\sqrt[4]{16} =$ 2

10. $\dfrac{35x^4y^8}{7x^{-3}y^5} =$ $= 5x^7y^3$

11. $8x^2y^6 + x^2y^6 =$ $9x^2y^6$

12. $\left(4xy^5\right)^3 =$ $64x^3y^{15}$

13. $\left(8x^2y^6\right)\left(x^2y^6\right) =$ $8x^4y^{12}$

14. Write $\sqrt[4]{y^3}$ in exponential form $y^{3/4}$

15. Square the binomial and simplify $(x-7)^2$ $= (x-7)(x-7) = x^2 - 14x + 49$

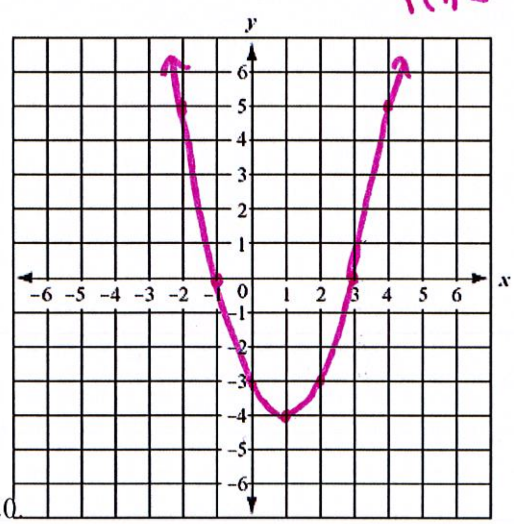
16. Multiply and simplify $(3x-1)(4x+5)$ $= 12x^2 + 15x - 4x - 5 = 12x^2 + 11x - 5$

17. Solve $(x-5)(3x+2)=0$ $x-5=0 \quad x=5 \quad 3x+2=0 \quad x=\frac{-2}{3} \quad \{5, \frac{-2}{3}\}$

18. Solve $x^2 + 7x = 0$ $x(x+7)=0 \quad \{0,-7\}$

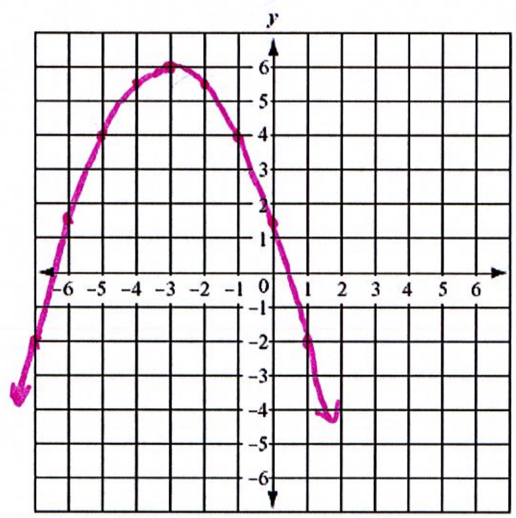
19. Solve $x^2 - 16 = 0$ $(x-4)(x+4)=0 \quad \{4,-4\}$

20. Graph $f(x) = (x+1)(x-3)$ axis $x=1$ $f(1)=-4$



20

18. Graph $f(x) = -\frac{1}{2}(x+3)^2 + 6$ $V(-3,6)$



19. Given the parent function $f(x) = x^2$, circle the letter of the correct description of the transformation $T(x) = (x-3)^2 + 1$.

a. Vertical shift up 3 units and horizontal shift right 1 unit

b. Horizontal shift right 3 units and vertical shift up 1 unit

c. Horizontal stretch by a factor of 3 and vertical shift down 1 unit

d. Horizontal compression by a factor of 3 units and vertical shift down 1 unit

20. Line A has equation $y=\frac{2}{5}x-6$. Line B contains the point $(4,-9)$ and is perpendicular to line A. Determine an equation in any form for line B.

line B

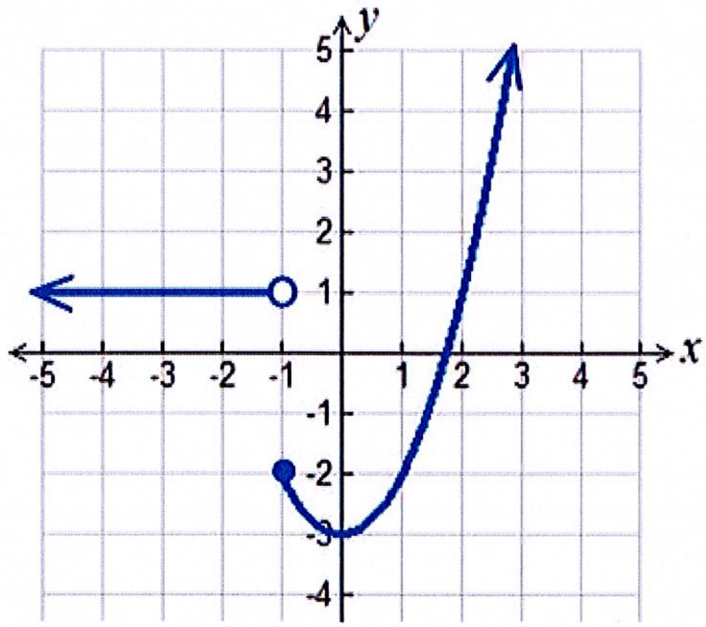
$y=\frac{-5}{2}x+b$

$-9=\frac{-5}{2}(4)+b$

$-9=-10+b$

$1=b$

$y=-\frac{5}{2}x+1$



21. Given the graph of $y=f(x)$ above, determine the following (approximate if necessary):

a. Write the domain of $y=f(x)$ in interval notation. $(-\infty,\infty)$

b. Write the range of $y=f(x)$ in interval notation. $[-3,\infty)$

c. Determine the value of $f(0)$ $=-3$

d. Determine the value of $f(-1)$ $=-2$

e. Determine the value(s) of x for which $f(x)=-3$ $x=0$

f. Using interval notation, determine the values of x for which $f(x)$ is increasing

$(0,\infty)$

g. Using interval notation, determine (estimate) the values of x for which $f(x)<0$

$[-1,1.8)$

22. First, convert $f(x)=3x^2-4x-15$ to factored form, then determine the coordinates of the x-intercepts of the parabola with this equation.

Let $f(x)=0$ $\quad 0=(3x+5)(x-3)$ $\quad 3x+5=0$ $\quad x=\frac{-5}{3}$ $\quad x-3=0$ $\quad x=3$ $\quad \left\{\frac{-5}{3}, 3\right\}$

23. Given functions $f(x)=x^2-7$ and $g(x)=x-3$, evaluate $f(g(x))$

$$f(g(x)) = f(x-3) = (x-3)^2-7 = x^2-6x+9-7 = x^2-6x+2$$

24. Factor $x^2-6x-40$

$$x^2-6x-40 = (x-10)(x+4)$$

25. Factor $x^3-7x^2-\cancel{16}4x+28$ using grouping $\quad x^3-7x^2-4x+28=0$

For #'s 27-32, solve for real and imaginary solutions, give all irrational solutions in simplified radical form, and give all imaginary numbers in i-form.

26. Solve $x^2+100=0$

$x^2=-100$ $\quad \sqrt{x^2}=\pm\sqrt{-100}$ $\quad x=\pm i\sqrt{100}$

$x=\pm i\cdot 10$ $\quad x=\pm 10i$ $\quad \{10i, -10i\}$

27. Solve $2y^3-24y=0$ using factoring (first factor out the common factor)

$2y(y^2-12)=0$ $\quad 2y=0$ $\quad y=0$ $\quad y^2-12=0$ $\quad y^2=12$ $\quad y=\pm\sqrt{12}$ $\quad \{0, 2\sqrt{3}, -2\sqrt{3}\}$

28. Solve $4x^2-25=0$ using factoring

$(2x-5)(2x+5)=0$ $\quad 2x-5=0$ $\quad x=\frac{5}{2}$ $\quad 2x+5=0$ $\quad x=\frac{-5}{2}$ $\quad \left\{\frac{5}{2}, \frac{-5}{2}\right\}$

29. Solve $3x^2-4x-20=0$ using factoring

$(3x-10)(x+2)=0$ $\quad 3x-10=0$ $\quad x=\frac{10}{3}$ $\quad x+2=0$ $\quad x=-2$ $\quad \left\{\frac{10}{3}, -2\right\}$

30. Solve $2y^2-20y+50=0$ using factoring (first factor out the common factor)

$2(y^2-10y+25)=0$ $\quad 2(y-5)^2=0$ $\quad y-5=0$ $\quad y=5$ $\quad \{5\}$

Double root

31. Solve $x^2-4x+13=0$ using the quadratic formula

$$x=\frac{4\pm\sqrt{(-4)^2-4(1)(13)}}{2(1)} = \frac{4\pm\sqrt{16-52}}{2} = \frac{4\pm\sqrt{-36}}{2} = \frac{4\pm i\cdot 6}{2} = 2\pm 3i$$

$\{2+3i, 2-3i\}$

32. Simplify $\frac{w+1}{16}+\frac{w-2}{20}$

$$=\frac{5(w+1)}{5\cdot 16}+\frac{4(w-2)}{4\cdot 20}=\frac{9w-3}{80}$$

33. Simplify $\frac{2x}{x-5}-\frac{3}{x}$

$$=\frac{x(2x)}{x(x-5)}-\frac{(x-5)(3)}{(x-5)(x)}=\frac{2x^2-(3x-15)}{x(x-5)}=\frac{2x^2-3x+15}{x(x-5)}$$

34. Simplify $\frac{n+1}{5mn^2}+\frac{m-2}{9m^2n}$

$$=\frac{9m(n+1)}{9m(5mn^2)}+\frac{5n(m-2)}{5n(9m^2n)}=\frac{9mn+9m+5nm-10n}{45m^2n^2}$$

$$=\frac{14mn+9m-10n}{45m^2n^2}$$

$(\cancel{x+2})(x+3)\left(\frac{10}{\cancel{x+2}}\right) = (x+2)(\cancel{x+3})\left(\frac{15}{\cancel{x+3}}\right)$

$10x+30 = 15x+30$

$10x = 15x$

$0 = 5x$

$0 = x$

$\{0\}$

35. Solve $\frac{10}{x+2}=\frac{15}{x+3}$ by multiplying the LCD on both sides

36. Solve $\frac{11}{6y}-\frac{1}{y}=\frac{5}{12}$ by multiplying the LCD on both sides

$12y\left(\frac{11}{6y}\right) - 12y\left(\frac{1}{y}\right) = 12y\left(\frac{5}{12}\right)$ $\quad 22-12=5y \quad 10=5y \quad 2=y$

$\{2\}$

37. Solve $\frac{22}{x^2}-1=\frac{9}{x}$ by multiplying the LCD on both sides

$x^2\left(\frac{22}{x^2}\right) - x^2(1) = x^2\left(\frac{9}{x}\right)$ $\quad 22 - x^2 = 9x \quad 0 = x^2+9x-22$

$0 = (x+11)(x-2) \quad \{-11, 2\}$

38. The rational function $f(x)=\frac{x^2-9}{x^2-4x-21}$ has the following domain:

$x^2-4x-21$

$(x-7)(x+3)$

a. $D:\mathbb{R}, x\neq 3, x\neq -3$ b. $D:\mathbb{R}, x\neq -7, x\neq 3$ c. $D:\mathbb{R}, x\neq 7, x\neq -3$

d. $D:\mathbb{R}, x\neq -4, x\neq -21$ e. $D:\mathbb{R}$ f.

39. The rational function $f(x)=\frac{x^2+5x+6}{x^2+1}$ has the following domain:

a. $D:\mathbb{R}, x\neq 3, x\neq 2$ b. $D:\mathbb{R}, x\neq -3, x\neq -2$ c. $D:\mathbb{R}, x\neq -1$

d. $D:\mathbb{R}, x\neq 1, x\neq -1$ e. $D:\mathbb{R}$ f.

40. The rational function $f(x)=\frac{x-8}{x^2-25}$ has an x-intercept at:

a. $y=0$ b. $x=5$ c. $x=8$

d. $y=\frac{8}{25}$ e. There is no x-intercept f.

x-intercept $(x,0)$

$y=0 \quad f(x)=0$

$0 = \frac{x-8}{x^2-25}$

$0 = x-8$

41. The rational function $f(x)=\frac{-4}{x^2-9}$ has a vertical asymptote with equation:

x^2-9

$(x-3)(x+3)$

a. $y=-4$ b. $x=9$ c. $x=3$

d. $x=-3$ & $x=3$ e. No vertical asymptotes f.

42. The rational function $f(x)=\frac{10}{x^2-4}$ has a horizontal asymptote with equation:

The degree of the denominator is greater than the degree of the numerator

a. $y=0$ b. $x=2$ c. $y=10$

d. $x=-2$ & $x=2$ e. There is no horizontal asymptote f.

43. The rational function $f(x)=\frac{6x^2+3x-1}{2x^2-18}$ has a horizontal asymptote with equation:

a. $y=6$ b. $x=3$ c. $y=0$

d. $y=3$ e. None of the above f.

degrees of numerator and denominator are both 2. The hor. asymptote results from dividing the coefficient of top x^2 by that of bottom.

$y=\frac{6}{2} \quad y=3$